



Minnesota
Pollution
Control
Agency

Watershed Section

Long and Farquar Lakes

TMDL Study: Excess Nutrients

Water Quality/Impaired Waters • July 2008

In 2002, the Minnesota Pollution Control Agency (MPCA) listed Long and Farquar Lakes as impaired for aquatic recreation under Section 303(d) of the Clean Water Act. The main cause for this impairment is excessive nutrients in the lakes. Excess phosphorus within the lakes and changes within the ecological community are causing extensive summertime algal blooms that decrease water clarity and cause noxious odors.

Long and Farquar Lakes

Long and Farquar Lakes, located in Apple Valley, Minn., are 34 and 67 acres respectively. Both lakes and their watersheds are located within the Vermillion River Watershed Joint Powers Organization in the southern part of the Minneapolis and St. Paul Metropolitan area. Long Lake is a shallow lake and is primarily used for non-motorized boating, aesthetic enjoyment, as well as for wildlife habitat. Farquar Lake, to which Long Lake discharges, is also a shallow lake and is used for limited motorized and non-motorized boating, swimming, fishing, and aesthetic enjoyment, as well as for wildlife habitat.

Both lakes' drainage basins are predominantly urbanized, and are dominated by low and medium density residential development. Overall, the watershed consists of approximately 23% impervious surfaces. Water quality in Long and Farquar Lakes has declined substantially since the mid-1990s. Algal blooms now occur throughout much of the summer season, negatively influencing recreational use and aesthetic enjoyment.



Farquar Lake

TMDL Background

The U.S. Environmental Protection Agency (EPA) requires states to develop Total Maximum Daily Load (TMDL) studies for waters that do not meet water quality standards and are listed as "impaired". This TMDL document assesses the nutrient load reductions needed for Long and Farquar Lakes to comply with Minnesota water quality standards. The specific sources of nutrients, target reductions from each source, strategies to achieve the reductions, and the approach to meet the applicable water quality standards for each lake are discussed in the document.

Long and Farquar Lakes Impairment

In-lake water quality data from 2002 through 2005 show June-September mean total phosphorus (TP) concentrations of almost 300 µg/L for Long Lake and more than 200 µg/L for Farquar Lake. Both concentrations significantly exceed the MPCA's Western Corn Belt Plains

(WCBP) Ecoregion shallow lake TP standard of 90 µg/L for Class 2B recreational waters. These are some of the highest nutrient pollution levels known for Minnesota lakes. A recent MPCA trend analysis revealed a statistically significant decrease in water clarity over the last 10 years in Farquar Lake.

Pollution Sources

The modeling and water quality analysis indicates that stormwater runoff and internal loading are the primary sources of nutrients to Long and Farquar Lakes which leads to conditions that promote algae growth.

The models also show that the majority of external phosphorus loading to the lakes can be attributed to urban runoff. Leaves and grass clippings, fertilizers, and sediments containing high phosphorus levels running off yards and streets flow into the storm sewer system, which then discharges to the lakes. Impervious surfaces such as streets and sidewalks also increase the ability of this phosphorus-laden water to reach lakes. Most of the runoff reaching Long Lake enters the lake via Apple Valley's stormwater drainage system, while the majority of phosphorus entering Farquar Lake comes from Long Lake.

Analysis of lake water quality data and modeling demonstrated that there is a large internal phosphorus load from a combination of curly-leaf pondweed dieback and sediment release of phosphorus. Phosphorus has built up in the sediments of the lakes after years of high phosphorus loads from urban runoff. This excess phosphorus is now available to be released into the water column when lake sediment is re-suspended by wind mixing or rough fish activity, dissolved oxygen levels are low, or pH levels are high. Phosphorus is also released when the heavy growths of the non-native invasive aquatic plant, curly-leaf pondweed, dies back in early to mid summer.

Strategies to Improve Water Quality

Implementation strategies to reduce phosphorus loading from both urban stormwater and in-lake loading will be needed in order for Long and Farquar Lakes to meet water quality standards. To reach the goal of 90 µg/L for in-lake phosphorus concentration for Long and Farquar Lakes, the annual phosphorus loads need to be reduced by 76% for Long Lake and 67% for Farquar Lake.

Since both Long and Farquar are shallow lakes, an approach of decreasing watershed phosphorus loads and managing fish and plant communities will be used to

return the lakes to a clear water, macrophyte-dominated state. Small, incremental reductions are possible through retrofit as redevelopment occurs and through the implementation of Best Management Practices (BMPs). Examples of BMPs would be to increase infiltration and filtration in the lakesheds through the use of raingardens and native plantings, identify key areas for more frequent street sweeping, retrofit detention ponds, encourage shoreline restoration, and educate property owners about proper fertilizer use and low-impact lawn care practices.

Next Steps

The TMDL study will receive a 30-day public comment period. Any comments received will be considered for incorporation into the TMDL. Once changes are made and approved by the MPCA, the TMDL is sent to the EPA for final review and approval. An Implementation Plan will also be developed which will describe the types of projects needed to improve the water quality of Long and Farquar Lakes.

For More Information

Bonestroo prepared the *Long and Farquar Lakes Nutrient TMDL Report* for the City of Apple Valley and MPCA in partnership with the Vermillion River Joint Powers Organization and Wenck Associates, Inc.

For more information about this TMDL, Apple Valley's water resources, and Minnesota's impaired waters:

www.ci.apple-valley.mn.us/natural_resources/water_resources/main_page.html

www.pca.state.mn.us/water/tmdl/project-longfarquar-nutrients.html

www.pca.state.mn.us/water/tmdl/

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